

Deployment of Java Web Application on Docker Using Jenkins

1. Introduction

This project demonstrates the deployment of a Java web application using Jenkins for continuous integration and Docker for containerization. The deployment is hosted on an AWS EC2 instance. The goal is to automate build, test, and deployment processes efficiently.

2. Tools Used

| Tool | Purpose |
|---------|---------------------------------|
| Jenkins | CI/CD automation |
| Docker | Containerization |
| AWS EC2 | Hosting the application |
| Maven | Build and dependency management |
| Git | Source code version control |

Architecture:

- EC2 Instance 1: Jenkins, Git, Maven (Ubuntu)
- EC2 Instance 2: Docker Host (Ubuntu)
- Application: Multi-module Maven project (server, webapp)
- Container: Tomcat
- Automation: Jenkins + Publish over SSH Steps Involved:
 1. Setup Jenkins on Ubuntu EC2
 2. Install Git & Maven
 3. Configure multi-module Maven project
 4. Setup Docker Host
 5. Create Dockerfile
 6. Configure Jenkins Job
 7. Automate Build & Deployment

Verify Application Key Implementation : Steps :

- server module packaging set to WAR
- Jenkins builds server.war
- Jenkins copies WAR to Docker host via SSH
- Docker builds image with WAR
- Docker runs Tomcat container

Conclusion

This project demonstrates successful automation of Java web app deployment using Jenkins, Docker, and AWS. Key takeaways include CI/CD setup, containerization, and troubleshooting common deployment issues.

Output:

Ec2:

| | | | | | | | | |
|---|-------------|---------------------|---------|----------|-------------------|-----------------------------|------------|------------|
| ✓ | jenkins-git | i-0494ddc6e0718ed3c | Running | t3.micro | 3/3 checks passed | View alarms | us-west-2b | ec2-34-221 |
| ✓ | docker | i-0eb83e6aa0e1b98f5 | Running | t3.micro | 3/3 checks passed | View alarms | us-west-2b | ec2-44-246 |

Jdk & mvn :

```
No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-34-2:~$ java -version
openjdk version "21.0.9" 2025-10-21
OpenJDK Runtime Environment (build 21.0.9+10-Ubuntu-124.04)
OpenJDK 64-Bit Server VM (build 21.0.9+10-Ubuntu-124.04, mixed mode, sharing)
ubuntu@ip-172-31-34-2:~$ wget https://d1cdn.apache.org/maven/maven-3/3.9.12/binaries/apache-maven-3.9.12-bin.tar.gz -P /tmp
--2025-12-31 06:26:53-- https://d1cdn.apache.org/maven/maven-3/3.9.12/binaries/apache-maven-3.9.12-bin.tar.gz
Resolving d1cdn.apache.org (d1cdn.apache.org)... 151.101.2.132, 2a04:4e42::644
Connecting to d1cdn.apache.org (d1cdn.apache.org)[151.101.2.132]:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 9233336 (8.8M) [application/x-gzip]
Saving to: '/tmp/apache-maven-3.9.12-bin.tar.gz'

apache-maven-3.9.12-bin.tar.gz      100%[=====] 8.80M --.-KB/s  in 0.09s

2025-12-31 06:26:53 (101 MB/s) - '/tmp/apache-maven-3.9.12-bin.tar.gz' saved [9233336/9233336]
ubuntu@ip-172-31-34-2:~$ sudo tar xf /tmp/apache-maven-*.tar.gz -C /opt

ubuntu@ip-172-31-34-2:~$ sudo chmod +x /etc/profile.d/maven.sh
ubuntu@ip-172-31-34-2:~$ source /etc/profile.d/maven.sh
ubuntu@ip-172-31-34-2:~$ mvn -version
Apache Maven 3.9.12 (848fbb4bf2d427b72bdb2471c22fcd7ebd9a7a1)
Maven home: /opt/maven
Java version: 21.0.9, vendor: Ubuntu, runtime: /usr/lib/jvm/java-21-openjdk-amd64
Default locale: en, platform encoding: UTF-8
OS name: "linux", version: "6.14.0-1015-aws", arch: "amd64", family: "unix"
ubuntu@ip-172-31-34-2:~$
```

Jdk & mvn Environmental path:

```
GNU nano 7.2
export JAVA_HOME=/usr/lib/jvm/default-java
export M2_HOME=/opt/maven
export MAVEN_HOME=/opt/maven
export PATH=${M2_HOME}/bin:${PATH}
```

Jenkins:

```
ubuntu@ip-172-31-29-182:~$ sudo systemctl status jenkins.service
● jenkins.service - Jenkins Continuous Integration Server
   Loaded: loaded (/usr/lib/systemd/system/jenkins.service; enabled; preset: enabled)
   Active: active (running) since Fri 2026-01-09 07:45:29 UTC; 3min 40s ago
     Main PID: 543 (java)
        Tasks: 37 (limit: 1017)
      Memory: 394.2M (peak: 422.7M)
         CPU: 28.936s
    CGroup: /system.slice/jenkins.service
            └─543 /usr/bin/java -Djava.awt.headless=true -jar /usr/share/java/jenkins.war --webroot=/var/cache/jenkins/war --httpPort=8080

Jan 09 07:45:26 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:26.780+0000 [id=31] INFO jenkins.InitReactorRunner$1#onAttained: Started all
Jan 09 07:45:26 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:26.798+0000 [id=35] INFO jenkins.InitReactorRunner$1#onAttained: Augmented al
Jan 09 07:45:27 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:27.683+0000 [id=31] INFO h.p.b.g.GlobalTimeoutConfiguration#load: global time
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.599+0000 [id=34] INFO jenkins.InitReactorRunner$1#onAttained: System confi
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.608+0000 [id=34] INFO jenkins.InitReactorRunner$1#onAttained: System confi
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.744+0000 [id=30] INFO jenkins.InitReactorRunner$1#onAttained: Loaded all j
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.748+0000 [id=35] INFO jenkins.InitReactorRunner$1#onAttained: Configuratio
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.810+0000 [id=30] INFO jenkins.InitReactorRunner$1#onAttained: Completed in
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.847+0000 [id=24] INFO hudson.lifecycle.Lifecycle#onReady: Jenkins is fully
```

Getting Started

Unlock Jenkins

To ensure Jenkins is securely set up by the administrator, a password has been written to the log (not sure where to find it?) and this file on the server:

```
/var/lib/jenkins/secrets/initialAdminPassword
```

Please copy the password from either location and paste it below.

Administrator password

.....

Continue

Jdk & mvn path:

JDK installations

+ Add JDK

JDK

Name

java

JAVA_HOME

/usr/lib/jvm/java-21-openjdk-amd64

☐ Install automatically ?

Maven installations

+ Add Maven

Maven

Name

maven

MAVEN_HOME

/opt/maven

☐ Install automatically ?

New Jenkins job:

Status

</> Changes

Workspace

Build Now

Configure

Delete Project

GitHub Hook Log

Rename



DevOps-Project-01

New Project

Permalinks

- Last build (#3), 58 min ago
- Last stable build (#3), 58 min ago
- Last successful build (#3), 58 min ago
- Last completed build (#3), 58 min ago

Edit description

Builds >

Filter

Today

#3 6:05 AM

Docker:

```
ubuntu@ip-172-31-29-137:~$ docker info
Client: Docker Engine - Community
Version: 29.1.3
Context: default
Debug Mode: false
Plugins:
  buildx: Docker Buildx (Docker Inc.)
    Version: v0.30.1
    Path: /usr/libexec/docker/cli-plugins/docker-buildx
  compose: Docker Compose (Docker Inc.)
    Version: v5.0.1
    Path: /usr/libexec/docker/cli-plugins/docker-compose

Server:
permission denied while trying to connect to the docker API at unix:///var/run/docker.sock
ubuntu@ip-172-31-29-137:~$ |
```

```
ubuntu@ip-172-31-29-137:~$ sudo su
root@ip-172-31-29-137:/home/ubuntu# cd ~
root@ip-172-31-29-137:~# docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS                               NAMES
a776a1ce0025   tomcat:v1      "catalina.sh run"       53 minutes ago Up 53 minutes 0.0.0.0:8086->8080/tcp, [::]:8086->8080/tcp   tomcatv1
465dfa09468b   1b6a1e45687e   "catalina.sh run"       2 hours ago   Up 2 hours    0.0.0.0:8087->8080/tcp, [::]:8087->8080/tcp   myapp
root@ip-172-31-29-137:~# |
```

```
root@ip-172-31-29-137:~# docker images

IMAGE                ID                DISK USAGE    CONTENT SIZE    EXTRA
myapp:v1              94c31b175f3b      595MB          156MB           U
tomcat:latest         689475f36b76      587MB          157MB           U
tomcat:v1             152e9e8d29e8      595MB          156MB           U
tomcatserver:latest   4657211b6655      595MB          156MB           U
root@ip-172-31-29-137:~# |
```

Tomcat :

Home Documentation Configuration Examples Wiki Mailing Lists Find Help

Apache Tomcat/11.0.15

If you're seeing this, you've successfully installed Tomcat. Congratulations!

Recommended Reading:

- [Security Considerations How-To](#)
- [Manager Application How-To](#)
- [Clustering/Session Replication How-To](#)

Developer Quick Start

- [Tomcat Setup](#)
- [Realms & AAA](#)
- [Examples](#)
- [Servlet Specifications](#)
- [First Web Application](#)
- [JDBC Data Sources](#)
- [Tomcat Versions](#)

Managing Tomcat

For security, access to the `manager.webapp` is restricted. Users are defined in:

```
$CATALINA_HOME/conf/tomcat-users.xml
```

In Tomcat 11.0 access to the manager application is split between different users. [Read more...](#)

- [Release Notes](#)
- [Changelog](#)
- [Migration Guide](#)
- [Security Notices](#)

Documentation

- [Tomcat 11.0 Documentation](#)
- [Tomcat 11.0 Configuration](#)
- [Tomcat Wiki](#)

Find additional important configuration information in:

```
$CATALINA_HOME/README.txt
```

Developers may be interested in:

- [Tomcat 11.0 Bug Database](#)
- [Tomcat 11.0 Javadoc](#)
- [Tomcat 11.0 Git Repository at GitHub](#)

Getting Help

FAQ and Mailing Lists

The following mailing lists are available:

- [tomcat-announce](#): Important announcements, releases, security vulnerability notifications. (Low volume).
- [tomcat-users](#): User support and discussion
- [tomcat-dev](#): User support and discussion for Apache Taglibs
- [tomcat-dev](#): Development mailing list, including commit messages

User :

dockeradmin

```
dockeradmin:x:1001:1001:Jagadish,5,9944258534,9944258534,other:/home/dockeradmin:/bin/bash
root@ip-172-31-29-137:/etc#
```

Now in order to access the server using the newly created User we need to allow password-based authentication. For that, we need to do some changes in the `/etc/ssh/sshd_config` file.

```
root@ip-172-31-29-137:~# vi /etc/ssh/sshd_config file.
```

```
# To disable tunneled clear text passwords, change to no here!
PasswordAuthentication yes
PubkeyAuthentication yes
KbdInteractiveAuthentication yes
ChallengeResponseAuthentication yes
UsePAM yes
#PermitEmptyPasswords no
```

Publish over SSH

SSH Servers

SSH Server

Name ?

docker

Hostname ?

172.31.29.137

Username ?

dockeradmin

Remote Directory ?

/home/dockeradmin

☐ Avoid sending files that have not changed ?

Advanced

Edited

Jenkins configure:

Source Code Management

Triggers

Environment

Build Steps

Post-build Actions

Git ?

Repositories ?

Repository URL ?

https://github.com/lagadishsrvt/DevOps-Project.git

Credentials ?

- none -

+ Add

Advanced ▾

+ Add Repository

Branches to build ?

Triggers

Set up automated actions that start your build based on specific events, like code changes or scheduled times.

- ☐ Trigger builds remotely (e.g., from scripts) ?
- ☐ Build after other projects are built ?
- ☐ Build periodically ?
- ☒ GitHub hook trigger for GITScm polling ?
- ☐ Poll SCM ?

Post-build Actions

Define what happens after a build completes, like sending notifications, archiving artifacts, or triggering other jobs.

Send build artifacts over SSH ?

SSH Publishers

SSH Server

Name ?

docker

Advanced ▾

Transfers

Transfer Set

Source files ?

Project-1/hello-world/webapp/target/*.war

Remove prefix ?

Project-1/hello-world/webapp/target

Docker file:

```
root@ip-172-31-29-137:/opt/docker# cat Dockerfile
FROM tomcat:9.0
RUN cp -R /usr/local/tomcat/webapps.dist/* /usr/local/tomcat/webapps
COPY *.*.war /usr/local/tomcat/webapps/
root@ip-172-31-29-137:/opt/docker# |
```

```
dockeradmin@ip-172-31-29-137:/opt/docker$ ls
Dockerfile  webapp.war
dockeradmin@ip-172-31-29-137:/opt/docker$ |
```

← ↻ Not secure 44.246.228.119:8086/webapp/

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Enter mobile

Enter Email

Password

Repeat Password

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← → ↻ 44.246.228.119:8087/webapp/

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Enter Name

Enter mobile

Enter Email

Password

Repeat Password

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